REMARKS

Claims 1-23 are pending in this application. By this Amendment, claims 1 and 2 are amended. No new matter is added. The specification is also amended as requested by the Patent Office.

The courtesies extended to Applicant's representative by Examiner Singh at the interview held August 29, 2006 are appreciated. The reasons presented at the interview as warranting favorable action are incorporated into the remarks below and constitute Applicants' record of the interview.

I. Specification

By this Amendment, the specification has been amended to add the generic description of OLEOPHOBOL® as a water-repellant finish, as suggested by the Examiner. Also, attached herewith is evidence confirming the accuracy of this generic description of OLEOPHOBOL®. See in particular the definition of "finish", where the definition refers to OLEOPHOBOL® as an example.

For the foregoing reasons, reconsideration and withdrawal of the specification objection are respectfully requested.

II. Claims

During the interview, the Examiner alleged that the claims are not clear as to whether the treatment of the threads is carried forward into the claimed end woven fabric. In other words, Examiner Singh indicated that the claims as written merely indicate a treatment of the threads, while the claims are directed to an end woven fabric material, and that if the treatment were removed, the end fabric would not include the water-repellant.

However, the threads are treated with water-repellant and the water-repellant finish remains with the threads in the end woven fabric (see, for example, page 3, paragraph [0012] of the present specification). Thus, claims 1 and 2 are amended to specify that the water-

repellant treatment remains with the threads in the woven fibers. Specifically, claims 1 and 2 have been amended to recite "wherein the resulting treated threads of the fabric have a water-repellant finish that is retained with the treated threads in the woven fabric."

For the foregoing reasons, reconsideration of the claims is respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-23 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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Date: September 15, 2006

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NOMEX® DICTIONARY

A B C D E F G H I K L M N O P Q R S T U V W Y Z

A

Abrasion resistance: mechanical test which, together with other physical measurements such as tear strength and tenacity, gives an indication of the estimated wearlife of garments: the higher the abrasion resistance of the fabric, the longer the average wear life of the garment. The most common test procedure is Martindale where a representative swatch is subject to repeated circular rubbings by a mechanical abrader. The level of abrasion resistance is judged as being the point at which a hole begins to appear in the fabric. Although not part of the EN 531 and EN 469 standards for personal protective equipment, EN 530 has been accepted as a European standard for measuring abrasion resistance.

Afterburn: the period during which a fabric burns after the flame has been removed or extinguished. It is described in the European test method EN 532, which is part of the EN 469 and EN 531 standards for personal protective equipment.

Afterglow: the period during which a fabric glows after the flame has been removed or extinguished. It is described in the European test method EN 532, which is included in the EN 469 and EN 531 standards for personal protective equipment.

Antistatic: see Antistatic

Aramids: family of polymers with certain common properties. The molecules contain aromatic benzene rings and amide groups. DuPont manufactures fibres from two types of aramid: NOMEX® meta-aramid and KEVLAR® high strength para-aramid. DuPont has aramid manufacturing plants in the United States, Japan, Great Britain and Spain.

Arc test: see ARC-MAN™

Asturias (Spain): see NOMEX® Production Site

up

B

Barrier Clothing: see TYVEK®.

Basic dyes: coloration medium recommended for the dyeing of uncrystallised NOMEX®brand fibres. See Cationic dyes.

BekinoxTM: trademark of Bekaert for its fine grade steel fibres. BekinoxTM is often included as an antistatic component in fabrics and garments made from NOMEX® and NOMEX®III fibres.

Benzyl alcohol: chemical used to dye and crystallise uncrystallised NOMEX® brand fibres. See Carrier. Blends: generally refers to the combination of different fibres in a spun yarn.

Break-open resistance: one of the most effective ways to reduce second and third degree skin burns is to make sure that the barrier of protective clothing between the heat source and skin remains intact during exposure. At DuPont this is called 'non-break-open protection' or, 'break-open

resistance'. Unlike conventional fibres, NOMEX® consolidates and thickens when exposed to a high temperature heat source. The presence of KEVLAR® in the fibre blend then prevents this swollen fabric from breaking open. Well engineered fabrics made from one of the NOMEX® family of fibres which also contain KEVLAR® maintain the all important protective barrier even during exposure to extremely high temperatures.

Burns: measures the degree of injury to human tissue caused by heat.
Second degree burns: irreversible skin injury at depths of between 100 and 2000 microns, building of blisters.
Third degree burns: irreversible damage to the skin at depths beyond 2000 microns.
'Pain' is acknowledged at the level immediately preceding a second-degree burn injury.
DuPont THERMO-MAN® mannequin is used to predict the level and location of second and third-degree burns following exposure of the mannequin to a simulated flash fire.

up

C

Carbonisation: is a type of thermal decomposition of the polymer. In NOMEX® fibres carbonisation starts at around 370°C and in KEVLAR® at approximately 480°C.These figures are given for normal atmospheric conditions.

Carrier: chemical which aids the molecules of dye to penetrate the fibre during the coloration of NOMEX®. It is also the agent responsible for the crystallisation of NOMEX®III fibres. See Benzyl Alcohol.

Cationic dyes: class of coloration medium recommended for the dyeing of uncrystallised NOMEX® brand fibres. See Basic dyes.

Cellulosic: generic term referring to fibres composed from the constituents of plant cells. Both cotton and viscose are examples of cellulosic fibres.

CEN: acronym for 'Comité Européen des Normes', the organisation chartered by the European Union to develop European Standards.

Chemical resistance: NOMEX® and KEVLAR® polymers are highly resistant to acids, alkalis, oil and solvents. However, given the porosity of both woven and knitted textiles, DuPont recommend that a non-flammable coating or impermeable membrane be incorporated into garments where a higher level of chemical protection is required alongside heat and flame protection.

Colour: several basic methods exist for introducing colour into a textile material, the most common being the dyeing of greige material, the injection of pigment and printing. Yarns coloured during the fibre extrusion process are generally referred to as pigmented. 'Trade dyeing' is a generic term describing a variety of techniques used by specialised dye houses to colour NOMEX® brand fibre yarns and fabrics. The most common of these are stock fibre dyeing, yarn dyeing and piece dyeing (see Stock dyed, Yarn dyed and Piece dyed). Such methods usually produce a lower level of lightfastness compared to pigmented fibre, but facilitate the production of smaller batches of fabric in specialised colours.

Comfort: see Comfort

Continuous filament yarn: see Filament yarn.

Convective heat: heat which is transmitted by convection from a central source such as a flame.

CORDURA®: DuPont registered trademark for its textured multifilament nylon fibre. CORDURA®, with its high strength and extremely good abrasion resistance, is used in a variety of applications including heavy duty work clothing where exposure to intense heat is not considered to be a risk.

Crystallinity and orientation: describes the alignment of molecules in a fibre. As a general rule, the higher the degree of crystallinity and orientation, the stronger the fibre. In a fully or highly crystallised and oriented fibre the molecules are packed tightly together with a strong degree of vertical alignment.

up

D

Decitex (dtex): unit for measuring yarn most commonly used in Europe. Indicates the weight of yarn in grams per 10,000 m. The lower the decitex, the finer the yarn. See Denier.

Denier: unit for measuring yarn, still used in many areas of the world and particularly in the United States. Indicates the weight of the yarn per 9000 m in grams. The lower the denier the finer the yarn. See Decitex.

Dry cleaning: garments made from NOMEX® or NOMEX®/KEVLAR® fibre blends may be commercially laundered and dry cleaned. For specific information, please refer to the instructions of the garment manufacturer.

Durability: critical to the wearlife of a garment. Abrasion resistance and tear strength testing are methods for assessing durability.

Dye: a material soluble in water or a solvent used to colour textile materials. DuPont recommend cationic or basic dyes for the coloration of NOMEX® fibres.

up

E

E89: DuPont internal reference number for certain types of NOMEX® used as heat barrier or backing for moisture barriers.

Ecru: undyed or natural colour.

Electric arc: see ARC-MAN™

European Norm (EN) or European Standard: a standard, which carries with it the obligation to be implemented at national level and having priority over any conflicting national standard. Signatories include Community States and EFTA members.
Prior to ratification Euronorms are generally known as PrENs (Preliminary European Norms).
EN 469: European standard for fire fighters' personal protective equipment.
EN 531: European standard for heat and flame protective clothing for industrial workers.
EN 659: European standard for fire fighters' gloves.

European Technical Centre or ETC: see European Technical Centre

up

F

Fabric construction: in a woven material, the type of weave including the number of warp and weft yarns per square centimetre of fabric. Described as ends and picks per 5 or 10 cm.

Fibrillation: fragments of fibre (fibrils) on the surface of a fabric, resulting from the breaking of a fibre along its longitudinal axis (can be compared to the 'splintering' of wood).

Filament yarn: most synthetic or man-made fibres are extruded from a solution or liquid polymer into single filaments, groups of which are then combined into multi-filament yarns. Filament yarns are less bulky and generally have higher physical properties than yarns spun from staple. Filament yarns of NOMEX® are available, although their use in protective apparel is generally limited to application such as Formula 1 race suits, flight jackets, clean room garments and liners.

Finish: generic term used to refer to impermanent treatments which aid either fibre processing or improve fabric performance. See Oleophobol.

Flame resistance: the extent to which a given material is able to resist combustion.

Flame-retardant: generic term referring to a chemical treatment designed to help a material resist combustion. Flame-retardants are applied topically and therefore may deteriorate during normal wash and wear cycles. Sometimes referred to as "FR Treatments".

Flammability: generic term used to refer to a material's ability to resist heat and flame.

Flash fire: refers to a sudden large scale flame or heat blast at extremely high temperatures caused by pressure changes and oxygen stimulation from an existing fire. THERMO-MAN®, DuPont computerised mannequin is used to evaluate the performance of thermo-protective clothing under simulated flash fire conditions.

FR treatment: see Flame retardant.

up

G

Greige: refers to an unfinished, undyed fabric.

up

H

Health and Safety: for many years DuPont has been ranked as the world's number one company for employee safety. As well as sharing its expertise through its Environmental and Safety Services Division, DuPont is keen to go beyond the minimum legal requirements in terms of product safety. For further information on the help and services available, please contact DuPont.

Heat transfer: measure of how quickly heat is transferred from layer to layer in a garment system as well as to the skin. The reduction, or at best, total reduction of heat transfer is critical to minimising burn injuries.

Heat Transfer Index: index used in EN standards to measure the transfer of radiant (EN 366)) heat through a given material. See also TPP.

Hybrids: generic term referring to fabrics composed of two or more type of yarn or

up

I

IFR: acronym for 'inherently flame resistant fibres', a term most commonly used in the USA. IFR fibres such as NOMEX® and KEVLAR® are able to resist combustion without the aid of chemical additives or treatments i.e. their flame resistance, along with other properties, is permanent.

ISO 9000: All currently operating DuPont aramid plants hold ISO 9000 approval for their quality

management systems.

up

K

KEVLAR®: DuPont«s registered trademark for its high-strength para-aramid fibre. One of the most important man-made organic materials ever developed, KEVLAR® brand fibre possesses a remarkable combination of properties that has led to its adoption in a variety of end uses since its commercial introduction in the early 1970«s. The overriding feature of KEVLAR® fibres is its strength - more than five times that of steel at equal weights. KEVLAR® fibres also offers excellent thermal and dimensional stability, as well as low elongation to break. It does not corrode and resists attack by most chemicals. KEVLAR® is also heat and flame resistant and enables fabrics made from NOMEX® fibres to resist shrinkage and stay intact during high temperature exposures. DuPont recommend the inclusion of KEVLAR® fibres in all NOMEX® fibre blends used for 'primary protective barriers' such as turnout gear, coveralls and gloves. For further information, click here.

Knitting: the formation of fabrics through the interlocking of loops of yarn or thread. Knitted fabrics are generally more 'open' than woven or other non-woven textiles and therefore generally more flexible. NOMEX® brand fibre 'knits' are available for polo-shirts, jogging suits, hoods, knitted liners, gloves and underwear.

up

L

Laundering: garments made from NOMEX® and NOMEX®/KEVLAR® fibre blends may be commercially laundered or dry-cleaned. For further information, please follow the instructions of the garment manufacturer.

Lightfastness: measure of the extent to which the colour of any material changes after exposure to simulated daylight. In Europe, lightfastness is generally measured on a 1 (poor) to 8 (good) blue scale and in the United States on a 1 to 5 grey scale. ISO 105 B02 is generally used to measure lightfastness.

LOI: acronym for limited oxygen index - a measure of the percentage of oxygen needed in the atmosphere before a material will either ignite or burn. The LOI of NOMEX® and KEVLAR® fibres is approximately 29.

Limited Flame Spread: CEN test method for evaluating the flammability of protective clothing. EN 532 is based on the vertical flame test procedure.

up

M

Man-made: fibres based on organic chemicals derived from natural material. Includes cellulosics and synthetics.

Martindale: test method used to measure abrasion resistance via the circular rubbing of fabric against fabric, and few pilling assessment.

Membrane (breathable): refers to a film which, prevents the penetration of water and, at the same time allows perspiration vapour to be transmitted away from the body.

Meta-aramid: see Aramid

Metric count: unit of yarn measure. Indicates the number of kilometres of yarn per kilogram.

Meyrin (Switerland): location of DuPont European Technical Centre: textile testing and research centre, and home of DuPont THERMO-MAN® mannequin.

Modulus (or Young's Modulus): the ratio of change in stress to change in strain within the elastic limits of a given material. High specific modulus is a key characteristic of KEVLAR® brand fibres.

Moisture regain: water suspended in the atmosphere, which may be absorbed by textile materials. NOMEX® fibres have relatively low moisture absorption (4,5 %).

up

N

Natural fibres: not man-made, such as cotton and wool.

Non-woven: technical textile term used to refer to any fabric which is not woven or knitted, such as unidirectional fabrics and felts. See SONTARA®.

NOMEX®, NOMEX®III, NOMEX® Antistatic, NOMEX® Comfort, NOMEX® Tough, NOMEX® Basicwear: see NOMEX® Fibres

NOMEX® pigmented: blends of NOMEX® and KEVLAR® fibres in which the component fibres are coloured by DuPont. Yarns and fabrics manufactured from pigmented fibres generally have a higher lightfastness than those which are 'trade dyed'.

NOMEX® Quality Programme: see NOMEX® Quality Programme.

up

O

Oleophobol®: registered trademark for water and oil repellent treatments manufactured by Ciba/Pfersee GmbH. Is based on the PTFE formulation of DuPont TEFLON® water and oil repellent treatment.

up

P

P140: see Part Antistatic

Pain: see Burns.

Para-aramid: see Aramids.

Piece Dyeing: technical term used to refer to the trade dyeing of fabrics as opposed to the dyeing of staple or spun yarns. Piece dyeing generally produces the same light and washfastness results as other trade dyed NOMEX® routes. A key advantage of the piece-dyed route is increased flexibility, since woven fabrics may be prepared and stocked in ecru form.

Pigment: coloration medium. Differs from dyestuffs in that the particles are solid and insoluble. This is a key reason for the high level of lightfastness which pigments generate in man-made fibres.

Pigmented: term used to denote that a fibre has been coloured by the original producer. Generally speaking, pigmented fibres give better wash and lightfastness results than trade dyed materials.

See also NOMEX® pigmented.

Pigment injection: method of introducing a coloration medium during polymer preparation. Pigment injection gives the highest values in terms of light and washfastness.

Pilling: is caused by either the wearing or washing of a garment where fibres are broken away from the main body of the fabric (but still remain attached by stronger fibres), forming into a small ball.

Plain weave: one of the three basic types of weave (plain, satin and twill), plain weave is the simplest form of woven fabric. In a plain woven fabric the weft yarn passes successively over and under each warp yarn, alternating each row. Plain weaves have no right or left side.

Polyamide: the generic term for NYLON.

PPE: acronym for Personal Protective Equipment. Often seen in the context of European Norms.

Pyjama check: type of weave whereby a strong reinforcing thread is introduced along the warp and weft at regular intervals. During thermal exposures, fabrics of this type are more stable, given that the 'check threads' are of a higher density (and therefore of a higher strength).

up

Q

Quality Programme: see NOMEX® Quality Programme.

up

R

Radiant heat: Heat which is transmitted by radiation from a central source such as a flame.

Rental laundry: generally companies who rent garments and take on responsibility for the maintenance of garments. An increasing numbers of rental laundries now include garments made from NOMEX® in their offering.

up

S

Satin weave: one of the 3 basic weaves (plain, satin and twill) in which the weft yarn floats over a number of warp yarns. Satin weaves generally have a smooth and lustrous surface.

Second degree burn: see Burns.

Sewing threads: an often neglected but still critical part of garment manufacture. If sewing threads have a lower decomposition temperature than the fabric, this may reduce the level of protection offered by the garment. Sewing threads of NOMEX® and KEVLAR® brand fibres are available.

Shrinkage: see Thermal shrinkage and Wash shrinkage.

SONTARA®: DuPont registered trademark for its family of spunlaced fabrics, as well as the technology used to make them. The DuPont developed non-woven process yields a product that is both durable and soft, comfortable and lightweight. The spunlaced fabric's softness and bulk comes from the hydraulic interlacing of the fibres (standard processes in the production of non-wovens use chemical or thermal bonding systems). SONTARA® fabrics offer high bulk and uniformity, whilst using up to 50% less fibre than woven fabrics. These factors help to make SONTARA® fabrics the

ideal choice for thermal insulation, particularly for liners and/or thermal barriers.

Source lists: see Where to buy or Contact us for further information.

Spun yarns: refers to yarns, which have been drawn and twisted from staple into the finished product.

Staple or 'staple fibres': short length fibre which are opened, carded, drawn and twisted into a spun yarn for use in woven or knitted materials.

Stock dyeing: dyeing of fibres by spinner before spinning yarn.

Stretch break: process of stretching a bundle of continuous filament yarns or tow under tension until the point at which they break. Stretch broken fibres are used like staple fibres to spin yarns. The stretch break process generally produces finer and stronger yarns than the conventional staple/ cotton or woollen spun route.

up

T

Tear strength: the ability of a cut fabric to resist tearing or ripping (ISO 4674/A2).

Tenacity or Tensile strength: refers to the strength of a fibre, yarn or fabric (ISO 5081).

Tex: unit for measuring yarn. Indicates the weight of yarn in grams per kilometre.

Textile properties: general term used to refer to a wide range of characteristics in a fabric including abrasion resistance and overall handle or feel.

Thermal insulation: extent to which a given material is able to prevent the transmission of cold or heat. The Thermal Protective Performance test is one way of measuring thermal insulation. EN 366 and EN 367, which measure the insulation of protective clothing against heat, are part of EN 469 and EN 531.

Thermal Protective Performance (TPP): see Thermal Protective Performance

Thermal shrinkage: the effect of dimensional change in a fabric after exposure to convective and/or radiant heat. In NOMEX® fibre blends containing KEVLAR®, the high-strength, high temperature resistant fibre forms a 'steel like grid' which, by helping to reduce the rate of thermal shrinkage, contributes to an increased level of personal protection. See Break-open resistance.

THERMO-MAN®: see THERMO-MAN®

Third degree burns: see Burns.

TPP: see Thermal Protective Performance

Trade dyed: generic term referring to fibres or fabrics which are not pigmented, i.e. coloured by the original fibre producer. Trade dyed products generally have a lower level of light and washfastness than pigmented items. Key advantages of the 'trade dyed route' are the range of colours available and flexibility in delivery. The three principal routes for the trade dyeing of NOMEX® fibre products are stock dyeing, fibre dyeing and piece dyeing. See Stock dyed, Trade dyed.

Twill weave: one of the three basic weaves (plain, satin and twill) in which the weft yarn floats across two or more warp yarns. Twill weaves are characterised by a diagonal (either right-handed or left-handed) pattern on the face of the fabric.

Twist: in textile terms the spiral arrangement of fibre around the axis of the yarn. The number of

twists is referred to as 'turns per centimetre' or 'turns per metre'.

TYVEK®: DuPont registered trademark for a family of tough, durable, spun-bonded high-density polyethylene sheet products. TYVEK® is strong, lightweight, flexible, smooth, low-linting, opaque and resistant to water, chemicals, abrasion and ageing. Its unique combination of properties makes TYVEK® ideal for a broad range of applications including disposable barrier clothing.
TYVEK-PRO.TECH®: DuPont registered trademark made available to converters whose garments made from TYVEK® 1431N fabrics meet DuPont stringent quality requirements in terms of design, seaming, finish labelling, aesthetics and fit. For further information, click here.

up

U

Uncrystallised: see Crystallinity.

Underwear: when evaluating materials for underwear, it is of primary importance that the materials used have: 1) a high melting point, 2) a high rate of heat absorption, 3) sweat wicking and 4) quick drying. DuPont has developed NOMEX® Comfort, a high comfort fine fibre blend for use in underwear.

UV stability: the rate at which a material's properties remain stable after exposure to ultra-violet (day) light. The protective features of the NOMEX® range of fibre products remain unchanged after periods of extensive exposure. As with all coloured products the one area of exception is lightfastness.

up

V

Velcro: hook and loop fastener which may be produced in a way which is suitable for thermo-protective clothing. The tape should be a fabric made from NOMEX® fibres, the hooks and loops from a heavy-duty nylon. Garments made from one of the NOMEX® family of fibres which use Velcro tape should be designed to ensure that the tape is adequately covered to prevent the nylon components from igniting.

Viscose: a cellulosic fibre, which in its untreated state is highly flammable. May however be chemically treated or chemically modified to increase its resistance to flame. A generally fine and porous fibre, viscose produces soft fabrics with a high level of moisture absorption.

up

W

Warp: the vertical yarns in a fabric, running parallel to the selvage edge.

Washfastness: the stability of a fabric after washing under recommended conditions, including dimensional and colour stability. The washfastness of NOMEX® or NOMEX®/KEVLAR® based fabrics is excellent, contributing to the exceptional wear life of garments made from one of the NOMEX® family of fibres.

Wash shrinkage: the degree in % of dimensional change in a fabric after washing.

Water repellence: the ability of a material to resist penetration by water. Woven and knitted textile

materials are not generally water repellent. Non-flammable treatments, coatings and membranes are therefore recommended to help prevent the ingress of water.

Wearlife: the period a garment can be worn before it no longer serves its original purpose. Wearlife is dependent upon a number of factors including lightfastness, washfastness, fabric shrinkage and abrasion resistance, but also working conditions. Wearlife is directly related to the average cost of a garment and is therefore a critical part of any purchasing decision. The wearlife of garments made from the NOMEX® family of fibres is exceptionally high. Examples of more than 10 years service with garments being washed more than 500 times is not unusual. See Cost Effectiveness.

Weaving: process of forming thread into fabric by running horizontal weft yarns over and under a series of vertical warp yarns. The style of weaving can effect both fabric performance as well as appearance.

Weft: the horizontal threads inserted over and under the vertical warp yarns to form a woven fabric.

Wicking: the ability of a textile material to move or transfer moisture or liquid from one place to another.

Wilmington (Delaware, USA): home to DuPont corporate headquarters.

up

Y

Yarn dyed: refers to the trade dying process of introducing the colour into a spun yarn.

up

Z

Zipper: to help reduce potential burn injuries to the minimum it is important that all accessories of a FR garment be non-flammable. Zippers backed with fabrics made from NOMEX® fibres are available. For further information please contact DuPont.

NOMEX®
Only by DuPont

up